

Multilayer-based Soft X-ray Polarimetry Research with SR at BSRF*

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ABSTRACT

A soft X-ray polarimeter multilayer-based has been designed and constructed at Beijing Synchrotron Radiation Facility (BSRF). The device includes the two dimensions azimuth angle and two double-angles compound framework. It can be used for analysis of the polarization characteristic of the SR beamline, measurement for quality of polarizing multilayer elements and application of soft X-ray magneto-optical. It can be also used as a versatile reflectometer. We have designed and developed some various polarizing elements which are the reflection, the transmission, non-periodic broadband, broad angular and phase shift multilayer. Using the home-made synthesized polarimeter on Beamline 3W1B of BSRF, the polarized properties of various polarizing elements (Mo/Si, Cr/C) have been measured and investigated systemically. The results of researches showed that the non-periodic and periodic multilayer can be used as polarizing elements in soft X-ray with synchrotron radiation. Using the home-made synchrotron radiation soft X-ray polarimeter and multilayer elements, the polarization characteristics of the Beamline 3W1B have been measured systemically at BSRF. The degree of linear polarization is up to 0.995 from 0.585 at 206eV when the beam is polarized by multilayer optical elements. We also measured magneto-optical (MO) Faraday rotation around the $M_{2,3}$ edges (60~70eV) of Ni film on 3W1B beam line of BSRF with the polarimeter and Mo/Si non-periodic broadband multilayer. The results demonstrate that the Faraday rotation angles are obviously large around Ni $M_{2,3}$ edges, the rotation angles are $1.85 \pm 0.19^\circ$ and $-0.75 \pm 0.09^\circ$ at the energy 65.5eV and 68eV, respectively.

Key Words: synchrotron radiation, soft x-ray, polarimeter, multilayer polarizing element, magneto-optical Faraday rotation

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